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ABSTRACT OF THE DISCLOSURE

A waveguide is disclosed that shifts the phase of the signal passing through it. In one embodiment, the waveguide has an impedance structure on its walls that resonates at a frequency lower than the frequency of the signal passing through the waveguide. This causes the structure to present a capacitive impedance to the signal, increasing its propagation constant and shifting its phase. Another embodiment of the new waveguide has impedance structures on its wall that are voltage controlled to change the frequency at which the impedance structures resonate. The range of frequencies at which the structure can resonate is below the frequency of the signal passing through the waveguide. This allows the waveguide cause a adjust the shift in the phase of its signal. An amplifier array can be included in the waveguides to amplify the signal. A module can be constructed of the new waveguides and placed in the path of a millimeter beam. A portion of the beam passes through the waveguides and the beam can be shifted or steered depending on the phase shift through each waveguide.